JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the act of Congress March 3, 1879.

VOL. XXXVII NO. 20 SAN FRANCISCO, NOVEMBER 11, 1916 PER COPY, 25 CENTS

THE MOST POWERFUL GOLD DREDGE AFLOAT.
BY ROBERT SIBLEY.

ELECTRIC POWER TRANSMISSION IN LOGGING
BY ALLEN E. RANSOM.

DOMESTIC LAMP SOCKET HEATING DEVICES.
BY E. A. WILCOX.

STANDARD ELECTRICAL SPECIFICATIONS.

LIBRARY OF CONGRESS COPYRIGHT DIVISION NOV 17 1916

MATERIALS ADVERTISED IN THIS ISSUE

Batteries
Edison Storage Battery Co.
Interstate Electric Noveity Co.

Boiler Feed Water Treatment
Dearborn Chemical Co.

Conduit Products
Sprague Electric Co.

Feeder Voltage Regulators
General Electric Company.

Insulators
Hemingray Glass Co.
Locke Insulator Mfg. Co.
Pierson, Roeding & Co.
Baker-Joslyn Co.
Thomas & Sons Co.

Ironing Machines
Hurley Machine Co.
Interstate Electric Co.

Motors
Century Electric Co.
Crocker-Wheeler Co.

Piping
Pittsburg Piping & Equipment Co.

Pole Line Hardware
Baker-Joslyn Co.
Pierson, Roeding & Co.

Power Plants
Chas. C. Moore & Co.

Resistance Units
Ward Leonard Electric Co.

Transportation
Southern Pacific Co.

Turbines
Pelton Water Wheel Co.

Vacuum Cleaners
Pacific States Electric Co.

Water-Wheel Generators
Westinghouse Electric & Mfg. Co.

Wire and Cable
The Okonite Co.

Wireless Apparatus
Haller-Cunningham Co.

Alphabetical Index to Advertisers, Page 8 Where to Buy It in the West, Page 9

Stimulate
Vacuum Cleaner Business
for the Christmas Holidays
by showing the

Thor

5

Vacuum Cleaner

$23.00

It sells —

It satisfies

Be prepared to handle
the Christmas trade
by ordering your stock now

PACIFIC STATES ELECTRIC CO.

The Modern Electrical Supply House

LOS ANGELES OAKLAND PORTLAND
SAN FRANCISCO SEATTLE

Address our nearest house.

The "THOR" IRONER

Another THOR Product backed by "HURLEY SERVICE"

Every woman who has an electric washing machine is a "live" prospect for the THOR Ironer. Her confidence in what the washing machine has done for her, offers a splendid opportunity to interest her in the THOR Ironer—an opportunity for more sales.

Send in your order today—add the THOR Ironer to your staff of washing machines—one will help sell the other.

Hurley Machine Co.

Chicago New York

Distributers for the Pacific Coast

PACIFIC STATES ELECTRIC CO.

Los Angeles Oakland Portland
San Francisco Seattle

NOV 16 1916

©CLB369820

JOURNAL OF ELECTRICITY
POWER AND GAS
Devoted to the Conversion, Transmission and Distribution of Energy

VOLUME XXXVII SAN FRANCISCO, NOVEMBER 11, 1916 NUMBER 20

[COPYRIGHT 1916 BY TECHNICAL PUBLISHING COMPANY]

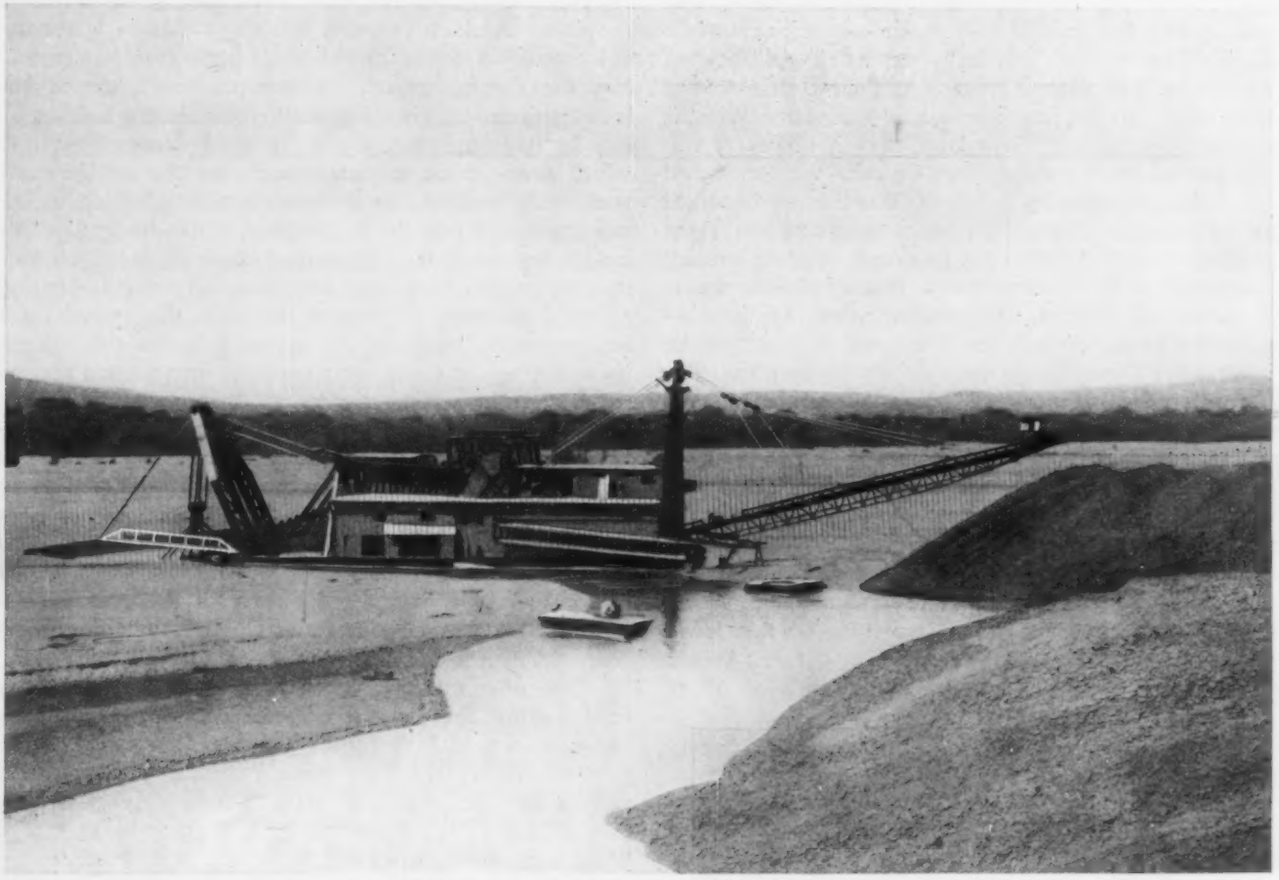
THE MOST POWERFUL GOLD DREDGE AFLOAT

BY ROBERT SIBLEY.

During the past twenty years hydroelectric development in California and the West has been nurtured from infancy to its present gigantic proportions.

This identical period is also noteworthy for a second brilliant accomplishment—namely that of the evolution of the modern electrically operated gold dredge, which today, like a monster nautilus, is eating its way into the gold-bearing gravels of northern California, and disgorging from its iron-clad shell each month hundreds of thousands of cubic yards of valueless material, but retaining for the use of man the precious metal so necessary in the activity of commercial life.

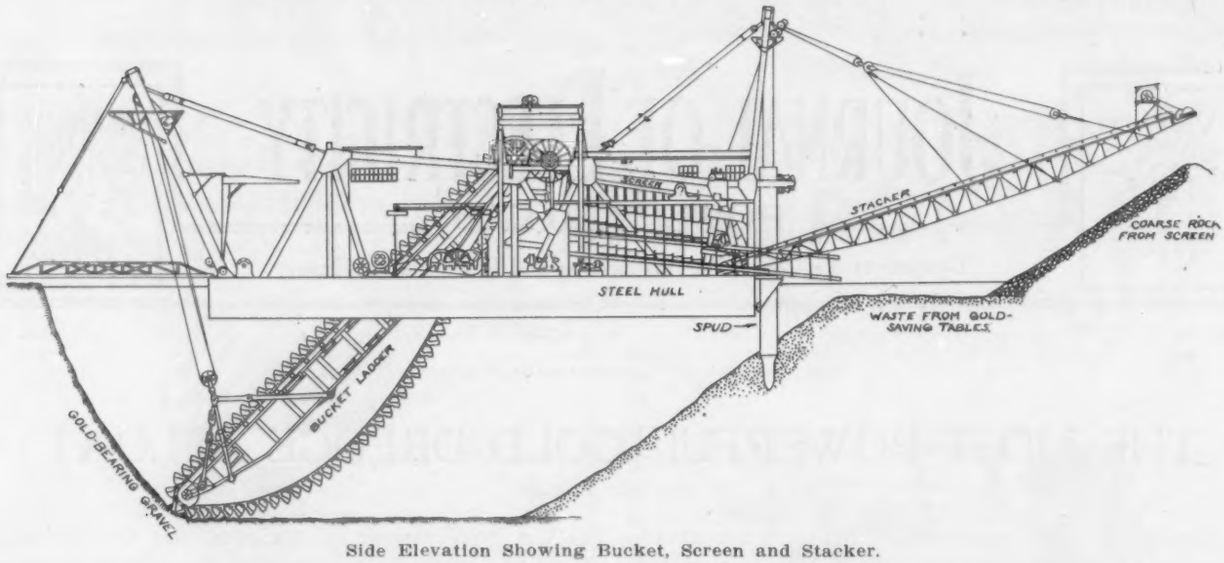
Since gold dredging now constitutes an important electrical load for the various power companies of the West, a brief resume of the principles involved in its operation together with some of the interesting details of a mammoth new dredge, recently put into operation at Hammonton, California, should not prove amiss at this time.



The Yuba No. 15—The Most Powerful Gold Dredge Afloat.

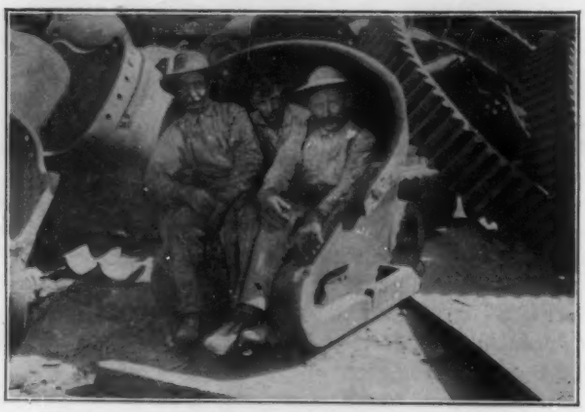
This latest and newest type of gold dredge is the most powerful in existence. Its buckets are of 17½ cu. ft. capacity, its depth of contact with the gold-bearing gravel is 84 ft. beneath the water level and its washings per month bring forth the hidden treasure stored in 300,000 cubic yards of river gravel.

In prehistoric times, perhaps thousands upon thousands of years before the advent of man, the present area occupied by the high Sierras was composed of compar-



Side Elevation Showing Bucket, Screen and Stacker.

atively level country that stretched up into Oregon and probably out across Nevada and Utah. Slow moving rivers trailed their way through this vast area and emptied themselves into a gigantic fresh water lake which is now the great interior basin of the Sacramento Valley. These rivers gradually deposited gold-bearing sediment as they passed onward in their course to this inland lake. As to just where this gold came from is not definitely known. At a later period, however, volcanic action covered these river deposits with mud and ash. Subsequently the uplift of the Sierras occurred and from comparatively low lying stretches of land these mountains rose to heights far in excess of their present towering pinnacles. The ancient stream beds were thus warped out of position, new and far more rapidly moving rivers were formed, the fresh water lake became land and the Coast Range came up out of the sea. The net result was that new gold deposits were made and new adjustments of river bottoms took place so that today the chief source of gold supply comes from this later deposit which has as its bedrock the volcanic ash and mud above mentioned, with a deeper and richer gravel deposit beneath. This latter deposit has not been prospected to any great depth as it is thought to be uneconomic to reclaim its gold with present methods of recovery. As an instance of the existence of this lower stratum of gravel deposit, the well sunk by a well known mining engineer may be cited. At a depth of 68 ft. the upper river gravel ceased and volcanic bedrock was encountered. This volcanic formation ceased at the 84 ft. level and gravel again was encountered. At 114 ft. the work, still in gravel, was discontinued as the purpose for which the well was dug—that of water development—was accomplished at that level, nevertheless the digging clearly showed the existence of the lower stratum of gravel beneath the volcanic bedrock.

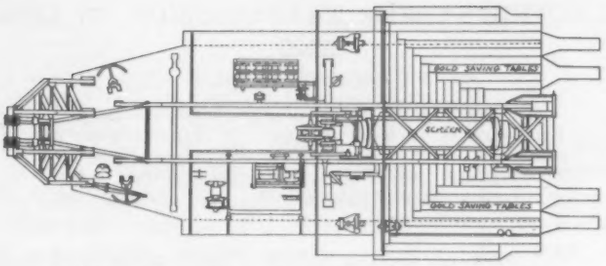


Giant Dredge Bucket of Seventeen and One-Half Cubic Feet Capacity.

In its simplest analysis the gold dredge is a hull which floats in an artificial pond that the dredge itself continually creates. In its front is a long ladder, inclining downward into the gravel bank to be dredged. This ladder has upon it a massive endless chain of buckets that are caused to revolve and scoop up the gold-bearing gravel. In order to recover the gold, this gravel must be thoroughly washed. To accomplish this the buckets upon the ladder dump their contents into a huge revolving screen in which streams of water play upon the gravel. This water washes the gold and the finer particles through the perforations in the screen. The coarser material, thoroughly washed, is dumped from the revolving screen upon a stacker. This stacker rises upward from the rear of the dredge and is operated by means of a long rubber belt which conveys the rock and gravel to a height sufficiently in the rear to dispose of this washed material so that it will not interfere with future operations of the dredge.

The finer material which contains the gold, having been washed through the screen, is dumped upon gold saving tables and there the gold is recovered. Since gold is heavier than the other material with which it falls from the revolving screen, it quickly passes to the bottom as it journeys over the gold-saving tables. Upon these tables are constructed riffles or obstructions which are inlaid with mercury. As the gold passes over this mercury there is found to be a great affinity between it and the mercury, consequently an amalgam is formed. Meanwhile the other fine material now free from gold is washed on down into the rear of the dredge where it is deposited near the coarser material above mentioned as coming directly from the screen.

Three or four times a month the gold-saving plates are cleaned of their amalgam, which is then heated in an oven. This heating process soon evaporates the mer-



Looking Down Upon Dredge showing Revolving Screen and Gold Saving Tables.

cury, leaving the free gold that is later shipped to San Francisco as gold bullion. The mercury which has thus been evaporated is later recovered by condensation and used again in the riffles for entrapping the free gold.

The dredge is held in position during its activity by means of heavy steel shafts known as spuds, which are raised vertically and allowed to fall due to their own weight, thus pinning the dredge to a stationary position in the dredge pond. For additional security guy wires are run ashore and securely lashed. When it is desired to move the dredge forward one spud is raised and the other anchored. By means of the guy wires and the alternate raising and lowering of spuds the dredge is then stepped forward "turkey fashion" as the small boy would say.

The new powerful dredge at Hammonton is of the bucket elevator type and is designed to dig to a depth of 84 ft. The hull on which the machinery is installed is of structural steel and the housing is of fireproof construction.

The buckets are approximately 17½ cubic feet capacity. The bottom and hood of the buckets are a single manganese steel casting with 41 in. between pin centers. The bucket pins which fasten the buckets to the endless chain, are 7⅜ in. in diameter by 33 in. long.

These buckets in an endless chain procession, revolve about upper and lower tumblers, the former a high carbon steel casting and the latter made of manganese steel. The digging ladder which supports the tumblers and the endless chain of buckets is of the plate girder type.

The upper tumbler shaft is driven at both ends through a double train of gears. The pulley shaft is of the differential type and thus divides the load equally between the two trains of gears.

The revolving screen into which the buckets dump their load of gravel is approximately 9 ft. in diameter by 50 ft. 6 in. in length. The perforated plates of which this screen is made are of ⅝ in. thickness and are made of high carbon steel. The perforations taper from ⅜ in. in diameter on the inside to ½ in. in diameter on the outside for the first, second, third and fourth sections of perforated plates. The lowest or fifth section of perforated plates has perforations tapering from ½ in. on the inside to ⅝ in. on the outside. Manganese obstruction rings are provided at the lower end of each of the screen plates to assist in thoroughly washing the dredged material. The drive for the revolving screen is of the friction roller type.

Two spuds are provided for anchoring and for stepping the dredge ahead. These are 38 in. wide by 60 in. deep in section and are about 70 ft. long. They are built of steel plates and angles with cast steel spud joints.

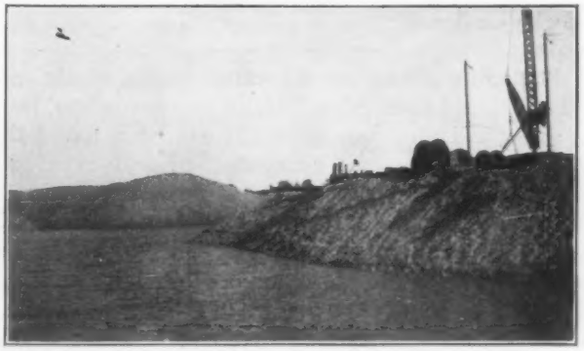
Under the revolving screen is a distributer of new design made of steel plates. Its function is to distribute the fine gold-bearing material passing through the screen so as to properly load the different sets of gold-saving tables.

The gold-saving tables are made of ⅛ in. steel plates. The sides of each sluice are formed by flanging up the bottom plate. This avoids any seams in the corners in which mercury and amalgam may be lost. The tables are of the double deck type and have a total area of approximately 8000 square feet. The riffles that are used on the gold-saving tables and in the side sluices are of wood, shod with ⅛ by 1¼ in. steel straps.

For washing and sluicing purposes several centrifugal pumps have been provided. There are two fourteen inch centrifugal pumps of 5500 gal. per minute capacity, one operated by a 150 h.p. motor against a head of 70 ft. and the other by a 75 h.p. motor against a head of 40 ft. There is also a six-inch, two-stage, centrifugal capable of delivering 1000 gal. per min. against a head of 120 ft. operated by a 50 h.p. motor, and in addition a four inch centrifugal pump capable of delivering 450 gal. per min. against a 65 ft. head operated by a 15 h.p. motor. Other smaller pumps are also installed.

A distinct advance is made in the electrical equipment of this dredge over any previous installation of this type. In general the electrical equipment is the same as that installed on the sister dredge Yuba No. 14, which is itself a model in electrical design. The main digging motor on that dredge is rated at 400 h.p., 514 r.p.m., 3-phase, 60-cycle, 440-volt, three-bearing slip-ring type with master controller, contactor, panels and resistance good for 50 per cent speed reduction. On that dredge, too, the contactor equipment is provided with inverse time limit overload control for alternating current operation.

The main motor on Yuba No. 15, on the other hand, is rated at 500 h.p. with contactor control, but this control is operated by direct current from a motor generator set installed on the boat. This gives a steady voltage for the operation of the contactor control and eliminates the fluctuations that would be felt on the alternating current operated control caused by the operation of the digging motor. The total installed capacity of motors on the Yuba No. 15 is 1007 h.p.



Channel in Which Dredge Operates.

The switchboard is an improvement over the board furnished for the Yuba No. 14 as it embodies all the latest safety features and is made as "dead front" as possible. The motors are started through double throw automatic oil switches, thus doing away with starting compensators on the dredge.

Unfused disconnecting switches have been added to each motor panel, placed in the circuit ahead of the oil switches in order to entirely disconnect the oil switches and motors from the line. These switches are all provided with insulating covers. The entire equipment is designed with an idea of "safety first" so as to protect the operator from coming in contact with live parts.

The mammoth dredge known as Yuba No. 15, which has been described above was built by the Yuba Construction Company of Marysville, California, of which Mr. Newton Cleaveland is general manager. The dredge was about four months in construction and cost nearly four hundred and fifty thousand dollars.

SAFETYGRAMS.

The Bureau of Safety suggests the following "safetygrams" which merit the serious consideration of all:

"Carelessness is one crime where punishment is quick and sure.

"It is better to take pains in preventing accidents than to suffer pains as a result of them.

"It is easier to do a thing right than to explain why you did it wrong.

"An ounce of forethought is worth several pounds of substantial regret.

"Isn't it funny that everyone thinks that the sign "This Means You" was put there for the other fellow?

"Accidents do not just happen. They are caused.

"Hold your temper—nobody else wants it, and besides, it may cause an injury.

"Your company tries to protect you. Are you doing your share to help?

"Carelessness is the short cut to death.

"Keep accidents down, or they'll keep you down.

"The only place a chance taker can find sympathy is in the dictionary."

Pasturing sheep on the canal banks of the Salt River project has been successful in controlling Johnson grass and also profitable. It has been found that the Johnson grass can be controlled and eventually eliminated, the use of the sheep also decreasing the cost of cleaning the canal. The sheep drive out the gophers and thus cut the cost of repairing breaks and reduce the loss of water by seepage to a minimum. In 1914 the sheep became so fat in 90 days that their effectiveness as "cleaners" was reduced and it was necessary to market the band. For the season 1914-15 there was an actual profit of over $400 on the sheep, the wool and increase more than covering the cost of herding. In addition there was an estimated saving of $4000 in canal maintenance. A total of 45 miles of canal and 32 miles of laterals were pastured, 1290 sheep and goats being in the bands in November, 1915.

ELECTRIC POWER TRANSMISSION IN LOGGING.

BY ALLEN E. RANSOM.

(In recent years electrical applications in logging have been on such an increase that today they are a vital part of the operation of the logging industry of the West. This interesting paper was read before the recent Pacific Logging Congress at Portland, Ore.—The Editor.)

The use of electricity in the lumber and logging industries has been the subject of many papers and discussions during the past decade and particularly with reference to the electric logging donkey and its various applications and relative advantages over the steam donkey in safety, fuel consumption, etc.

In connection with the use of the electric donkey, the questions and problems of getting electric power to the point of service are worthy of note and are in a general way the text of this paper.

In some ways electricity is analogous to a pipe carrying water. Electrical voltage has its equivalent in the pounds of pressure exerted by the water in the pipe; amperage is directly analogous to the quantity of water; while the size of the transmission wire is equivalent to the diameter of the pipe.

The flexibility of the alternating 3-phase, 60-cycle current has made it the standard in the electrical field for the transmission of electrical energy. By means of transformers the current can be stepped down or up to any voltage desired for different distances of transmission. The higher the voltage, the greater the distance the current can be transmitted with the least loss and least investment for transmission wire.

Owing to the changing locations of logging camps it is generally impracticable to build a power generating station of either the steam or water driven type for this service. Consequently the source of energy is generally a logging company's sawmill; a transmission line of a larger power company; or from a transmission line from the mill along the logging road to the point where it can be taken off at a lower voltage for the camp.

The possible power requirements of a two-engine logging camp can be roughly estimated as follows: 2 electric donkeys, 300 h.p.; blacksmith shop, 10 h.p.; camp lighting installation 5 h.p.; portable compressed air plant 15 h.p.; heating and cooking (possible with cheap power), 30 h.p.; total demand 360 h.p.

As a rule all this power is seldom on at one time so that a capacity in the transformer station or mill plant available for use at the camp may be considered at 300 h.p. or basing on one kilowatt at the generating or substation plant for each horsepower used at the camp. A transformer capacity of 300 kw. in three 100 kw. units should be provided.

The voltage used on the donkeys is generally 440 volts and the transformer can be provided with taps for either 220 or 110 volts for the other requirements of the camp.

The voltage used in the transmission of power depends upon the distance of the camp from the source of power. For a camp requiring 300 kw. the following table is of interest. The loss in power in the following installations would not exceed 10 per cent.

Distance from source of power.	Voltage at camp transformer.	Size of copper wires.	Weight of Wire per 1000 ft. (single)	No. of wire
4 to 6 miles.....	2200	No. 2	200 lbs.	3
8 to 10 miles.....	6600	No. 4	126 lbs.	3
12 to 15 miles.....	13200	No. 6	80 lbs.	3
20 to 25 miles.....	22000	No. 6	80 lbs.	3

The transformers at the camp, therefore, would have to have their primary voltage based on the distance from the point of origin, while the secondary voltage would be the same in all cases, either 440, 220 or 110 volts. The line construction for any of the voltages specified can be standardized with the exception that the spacing of the wires must be increased as the voltage increases, which are as follows: 220 volts, 18 inches; 6600 volts, 24 inches; 13200 volts, 30 inches; 22000 volts 36 inches.

Different insulators must also be used for different voltages but the cost varies but comparatively little.

The country traversed determines to a great extent the length of the spans, but with copper wire of the sizes specified, 175 ft. does not cause too much sag. This is based on using 35 ft. poles, sunk 6 ft. in the ground.

The cost of transmission line per mile for 300 h.p. would be approximately the following, including material and labor:

35 ft. poles; 8 in. tops	$ 3.50
Cross-arm, 4x5-4 pin	.40
3 iron cross-arm insulator pins	.45
3 insulators	1.50
2 galvanized cross-arm braces	.45
1 10x⅝" cross-arm bolt	.10
3 3x⅜" lag bolts for braces	.15
Framing poles and mounting materials	1.00
Digging holes and raising	1.00
Stringing wire per pole	1.25
Painting butts and cross-arms	.25
Total	$10.05x35=$351.75

In the above figures engineering and clearing are not included and the right of way is assumed free. The cost of the wire owing to the unsettled market cannot be estimated accurately. Assuming the cost of the wire to be 25 cents per pound delivered, the cost of the line per mile would be the following:

Size of line.	Labor and material.	Cost of copper.	Total.
2200 volts No. 2	$351.75	$825.00	$1176.75
6600 volts No. 4	360.00	520.00	880.00
13200 volts No. 6	375.00	330.00	705.00
22000 volts No. 6	400.00	330.00	735.00

Increases in labor and material are due to the slightly higher cost of insulators and different cross-arm spacing for increased voltages. Due to the high price of copper some transmission companies are using a W BB grade of galvanized iron telegraph wire but owing to its high resistance and low conductivity as compared to copper, which is 16.1, care must be exercised in using it. A duplex metal copper-clad steel wire is also made and used to some extent. Aluminum is used on some lines but its conductivity is low, being about 63.1 in favor of copper.

Owing to the fact that the majority of camps are not very permanent, it is the writer's opinion that copper is the best conductor. It always has tangible value and it can be taken down and restrung on a new line without serious damage and it generally gives the best results. Aluminum is fragile and restringing it reduces its value.

A line built along the ideas mentioned herein can be moved or extended and its poles can be cut along the route. Upon change of location, the material can be removed from the old poles and a salvage value of $600 to $1000 per mile realized from the original cost.

The camp transformer whether mounted on skids or on a train along the road can be served by the main wires at any voltage, at very little expense.

As to the distribution of power in camp, this offers little difficulty. The voltage is not greater than 440 and is not dangerous. The donkey motors are generally supplied direct from the main transformers by a 3-conductor flexible armored cable which can be as long as 1000 ft. if necessary and allowing that radius of action from the transformer station. The low voltage wires for the camp can be carried also in a 3-conductor cable and distributed at the camp for lights and other purposes. Small motors can be used for operating forge blowers, compressors, drill presses and similar tools. At the present time the electric cooking range has not become a general utility article for rough service, but it is not to be eliminated as a possibility for camp use where cheap power is available. The hot water bayonet type heater is a success and the air heaters are becoming more generally used.

All of these devices tend to reduce labor, and add to the general mobility of a camp. In cold, disagreeable weather it is a great comfort to be able to have light, power and heat instantaneously.

CARE OF FARM DITCHES.

Here are a few excerpts from the Reclamation Record that may assist the power salesman in giving helpful suggestions to a prospective consumer:

"How about the farm irrigation and drain ditches? No doubt the irrigation season just passed has found some faults in the layout, capacity, or efficiency of the ditches. Now is a good time to correct some of these faults.

"It is likely that one of the most serious drawbacks has been the presence of weeds in the ditches, hindering the flow of water and causing it to overflow low banks. More than likely these same ditches are now a mass of ripened weeds, depositing their seeds for a still more lusty growth next season. Gather up these weeds, with as little scattering of seeds as possible, and burn them. Make the piles for burning on spots where the most obnoxious weeds grow in order that their seeds will not be scattered and may be burned most effectively.

"Go over the ditches and, as far as is practicable at this time, remedy the weak spots. Build up low banks so the dirt will settle well before next irrigation season. Put in new or replace old checks where needed; remove the silt from the bottom of ditches and use it to fill borrow pits or low places near by. Don't make the mistake of building the banks higher at points where the ditches collect silt; you are making future trouble if you do. Keep the ditches cleaned out to the proper grade.

"The most important part of the irrigation work is done outside of the time you are actually irrigating. Removing obstacles to easy handling of water and having everything possible in full readiness makes for quicker, better, and cheaper irrigation. If you have a little time just before winter sets in, do some work on your ditches."

DOMESTIC LAMP SOCKET HEATING DEVICES.

BY E. A. WILCOX.

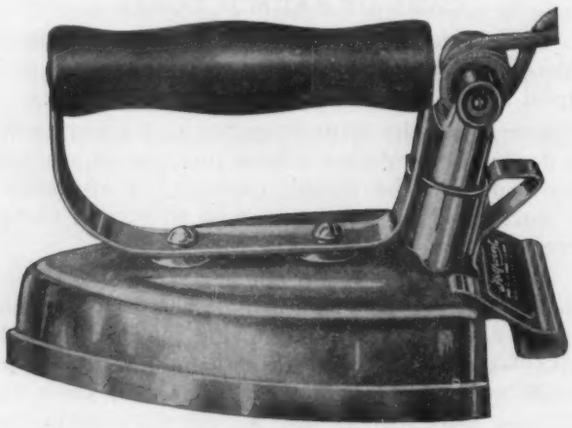
(In this article the author treats of certain electric heating devices that may be attached to the wiring system of the ordinary household without readjusting the wiring fixtures. The importance of a familiarity of the modern sales manager with such devices is apparent.—The Editor.)

Importance of Labor Saving Devices.

When we look back and think of how the housewife of the past was hampered in the performance of her duties, and compare these difficulties with her present day opportunities of making housework an enjoyable pastime, we naturally wonder whether it is possible for the future to bring forth conditions which will be any more ideal.

The various household labor saving devices which have so enormously transformed economic conditions are here classified, as well as possible, to set forth their chief points of superiority. Although a single device may produce only a small revenue, taken collectively these devices are of ever increasing importance in the production of profitable central station incomes.

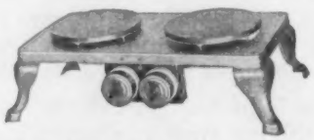
Electric Irons.—These were the first heating devices to come into universal use. They are now manufactured in many sizes, shapes and capacities and sold



Hot Point Iron.

in greater quantities than any other electrically heated device known.

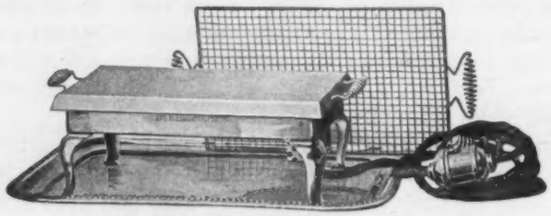
The principal advantages of the electric iron over the old fashioned sad iron are saving in time and steps, even heat distribution, freedom from smoke, grease and soot, absence of excessive heat, and ease with which it may be used in any part of the house. Irons varying in weight from 3 pounds to 9 pounds and in capacities from 200 watts to 675 watts are available for domestic use.



G. E. Twin Plate Disc Stove.

Electric Stoves.—Both the disc and open coil type are manufactured in various sizes and capacities. The disc stove has a metallic heating surface and delivers heat to the utensil by conduction. The open coil stove gives off radiant heat from exposed coils which are usually imbedded in grooves of porcelain or mounted above metallic reflectors.

Electric stoves are useful for many household purposes in place of gas or alcohol burners. They are suitable for heating water for various purposes, or for doing light cooking. They are safe, convenient and durable. For domestic lamp socket use they are seldom larger than six inches in diameter and 600 watts in capacity.



Westinghouse Horizontal Toaster Stove.

Toaster Stoves.—Two distinct types are made—horizontal and vertical. Toast made on the horizontal type will be produced quickly but will not be toasted through so well unless the bread be dry. Toast made below radiant coils or in the vertical type toasters will be produced slowly but will be toasted thoroughly. Vertical toasters are usually provided with a warming shelf on top to keep toast or other food warm.

Hot Point Vertical Toaster.

One great advantage of electric toasters is that they may be used on the dining room table instead of in the kitchen. From 400 to 600 watts are usually required for operating toasters.

Universal Chafing Dish.

Chafing Dishes.—These frequently have an outer pan in addition to the food pan for use as double boil-

ers. The food pans are made in two and three-pint sizes. The capacities vary from 250 to 600 watts. A wide variety of styles and ornamental types are available.

Electric chafing dishes are obviously safer to operate than alcohol or other flame types, and furthermore they give off no disagreeable odors or fumes.

Coffee Percolators.—Coffee made in an electric percolator is rich in flavor, free from grounds, and contains less caffein and other harmful elements than boiled coffee. Starting with cold water, strong coffee may be prepared in from ten to fifteen minutes.

Hot Point Percolator.

Electric percolators in all styles, shapes and character of ornamentation and in sizes varying from four to nine cups are available. They usually require from 450 to 600 watts. They are ideal for use on the dining room table because they are attractive in appearance and also keep the coffee hot with practically no attention.

Tea Samovars.—The housewife who prides herself on her tea-making is pleased with a device where the tea-ball may be drawn up when the infusion is just right and a beverage served of fine flavor, and free from the bitter tannic acid taste that results from boiling tea-leaves in an ordinary pot. It is especially desirable for the afternoon tea because it can be operated in the living room. It furthermore does away with the disagreeable odors, fumes and dangers of alcohol or other fuel types.

Tea samovars are usually made in 5, 6 and 7 cup sizes and in capacities varying from 400 to 500 watts.

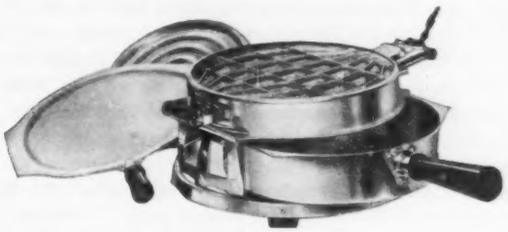
Tea Kettles.—Two and three pint sizes are usually made, requiring from 400 to 550 watts for operation. They are convenient and dainty for heating water for the tea service. They make an attractive addition to the table and possess the charm of a modern household luxury.

Table Cooking Outfits.—Single disc stoves supplied with a variety of hollow-ware utensils are called unit-sets, dining room sets or combination stoves. Coffee percolators, tea samovars, chafing dishes, nursery milk warmers, frying pans, tea kettles, griddle plates, and other utensils are included in the various sets.

These devices bring electric cookery within reach its cleanliness, and convenience. For the hostess who does her own cooking the table cooking outfits are ideal. They are an ornament to any sideboard or table.

Simplex Dining Room Set.

Electric Grills.—Many handy devices for cooking on the dining room table, or in the sick room, and which are attractive and convenient, are made by various heating appliance manufacturers. The Hotpoint El Grillo is a useful table device. It may



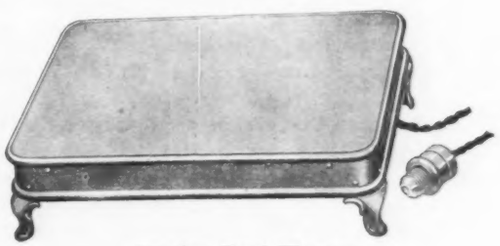
Hot Point Grill Stove.

be used for light toasting, frying and broiling as well as for boiling. Two of these operations may be carried on at one time as the utensils may be placed both above and below the glowing coils. It has a capacity of 600 watts and the dimensions of the heating element and pans are 4¼ by 8½ inches.

The Westinghouse toaster stove is really a small complete cook stove. It may be used for broiling, frying, toasting, boiling or making griddle cakes. The stove is 5¼ by 9 by 3⅝ in. high and consumes 500 watts.

The General Electric radiant grill may be used for frying, stewing, toasting, and broiling. This device consumes 600 watts.

Food Warmers.—Food warmers are made in a variety of portable styles, shapes, and sizes, and may be used on the table or sideboard.



Simplex Food Warmer.

Simplex nickel or silver plated food warmers of the following sizes and capacities are available:

Oval shape, 10 in. by 14 in.	170 watts
Oblong shape,	
10 in. by 14 in.	200 "
10 in by 18 in.	250 "
Oblong shape (extra heavy)	
10 in. by 14 in.	200 "
10 in. by 18 in.	250 "
10 in. by 26 in.	400 "

STANDARD ELECTRICAL SPECIFICATIONS.

BY H. CONGER BOWERS.

(These specifications were prepared for the use of the Southern California Electrical Contractors' and Dealers' Association and the Los Angeles architects, for both of whom the author is acting as consulting electrical engineer. They are suggestive for use elsewhere. The general introductory provisions regarding business relations between the contractor and the architect have been omited.—The Editor.)

General.—The work to be done consists in providing all materials, appliances, equipments, tools, labor, etc., unless otherwise stipulated, and the installation of certain electrical systems for power, heating, lighting, telephones and bells in the owner's premises, comprising three buildings, connecting pergolas, garage and yard, situate at..... in Los Angeles, California, all to be as herein described and in accordance with the contract documents.

All wires, except as may be hereinafter specified, shall be run in approved rigid galvanized or sherardized conduits.

Circuits of different systems must not be run in same conduit, but with the exception of service wires, two or more circuits of the same system may be pulled in the same conduit: Provided the fuses of the largest wire or any circuit will protect the smallest wire as specified in Code Rule No. 18.

The contractor shall furnish and have built in all necessary supports for conduits and boxes.

All conduts, junction boxes, outlet boxes, etc., must be properly concealed while the building is in the course of construction, as no cutting will be allowed except by permission of the architect.

Power System.—The system of wiring for power shall be for 220-volt, 3-wire, 3-phase, and shall consist of a separate and complete system of conduits, boxes, wires and appliances from the main switchboard to each and every power, or control outlet shown on plans or herein specified, inclusive of all equipment and appliances herein provided for.

Service to be as hereinafter specified.

Feeders to be as hereinafter specified.

Conductors in power circuits shall be of such size that the drop in potential will not exceed one per cent with full connected load.

Heating System.—The system of wiring for heating will be for 110-220-volt, 3-wire for feeders and sub-feeders, and 110-volt, 2-wire distributing circuits, unless otherwise specified, and shall consist of a separate and complete system of conduits, boxes, wires and appliances from the main switchboard to each and every outlet shown on plans or hereinafter specified inclusive of all equipment and appliances herein provided for.

Service to be as hereinafter specified.

Feeders to be as hereinafter specified.

Heating circuits shall be of such size, that the drop in potential will not exceed one per cent with the full connected load.

Lighting System.—The system of wiring for lighting will be for 110-220-volt, 3-wire for feeders and sub-feeders, and 110-volt, 2-wire distributing circuit and shall consist of a separate and complete system of conduits, boxes, wires and appliances, from the main switchboard to each and every light, receptacle or switch outlet shown on plans or herein specified, inclusive of all equipment and appliances herein provided for.

Service to be as hereinafter specified.

Feeders to be as hereinafter specified.

Lamp or distributing circuits shall be of such size that the drop in potential will not exceed one per cent, with the full connected load.

All lamp circuits shall be so arranged that not more than 16 sockets or receptacles, requiring not more than 660 watts shall be dependent on any one cutout.

Telephone System.—The wiring for telephone shall consist of a separate and complete system of conduits, cables, wires and appliances connecting each and every telephone outlet shown on plans or herein specified, inclusive of all instruments, appliances and equipment shown or herein provided for.

Size of conduits, cables and wires shall be as herein specified.

Bell System.—The wiring for bells shall consist of a separate and complete system of conduits, boxes, wires and appliances, connecting the source of electric supply to each and every outlet shown on plans or hereinafter specified, inclusive of all battery, equipment and appliances herein provided for.

Underground Work.—All exterior work shall be run underground in approved galvanized rigid conduit, as hereinbefore specified, at least 18 inches below the finished surface.

Conduits shall be installed with leaded joints, shall terminate in the proper condulets or outlet fittings, which shall be closed to prevent the entrance of moisture of any foreign substance.

The conduit shall be given a coat of asphaltum paint or tar applied hot.

Conductors for power, lighting or heating circuits, shall be a standard 600-volt cambric insulated lead covered cable.

Telephone conductors shall be a standard double silk and cotton insulated braided and lead covered switchboard cable, having the required number of conductors and at least two extra pair.

The conductors shall be of the size hereinafter specified and shall be continuous from outlet to outlet, as no joints or splices will be permitted in the conduit.

The ends of cables must be impregnated with compound to prevent the absorption of moisture, must be properly served with rubber and cotton tape and well painted.

Telephone or bell wires must not be run in the same conduit with lighting or power wires.

Symbols and Location of Outlets.—The various outlets are indicated on plans by N. E. C. A. symbols, and indicate the approximate location of outlets only.

Figures in power outlet symbols indicate the number of horsepower for which the outlet is to be wired.

Figures in heating outlet symbols indicate the wattage for which the outlet is to be wired.

Figures in lighting outlet symbols indicate the number of 40 watt lamps.

Light outlets not marked, unless otherwise specified, shall be wired for 120 watts.

The contractor shall obtain from the architect the exact location of all outlets and exact height of all brackets, receptacles and switch outlets.

Service.—From the cross arm on lighting company's pole to the main switchboard, this contractor shall run underground, in the manner herein described, a four wire service.

This service to be a standard 600-volt, 4-conductor cambric insulated and lead covered cable having a 3/32x3/32 varnished insulation and 3/32 lead sheath.

Conductors in this cable to be No.—— B. & S. G. stranded.

Cable shall terminate at either end in a standard 600-volt open air terminal.

This contractor shall figure on a distance of 100 ft. from the exterior wall of building to base of pole as measured along the ditch and he shall state in his bid the amount per lineal foot installed, to be added or deducted, should this distance be over or under 100 ft., the exact location of pole to be obtained before cable is ordered.

Main Switchboard.—The main switchboard to be furnished and erected in engine room by this contractor, shall consist of a blue Vermont marble panel of ample size to accommodate the switches and equipment hereinafter specified.

Marble to be of good quality, free from mineral veins, not less than 1½ inches thick, with ⅜ inch bevel edges and polished face, bevel and edges.

Frame for this panel shall be built of 1¼ inch angle iron, of rigid construction, supported by ornamental iron legs securely fastened to floor, and shall be braced to wall with one inch standard pipe braces.

Supporting bolts to be provided with polished copper heads and ⅛ inch rubber washers inserted between marble and frame.

Frame, legs and braces to receive two coats of asphaltum varnish.

Provide and mount the following switches and equipment on face of panel:

One — Amp. 3 P. S. T. fused knife switch—Main Lighting.
" " 3 " " " " " " " Power.
" " 3 " " " " " " " Heating.
" " 3 " " " " " " " Lighting Feeder—Main Bldg.
" " 3 " " " " " " " " " West Wing.
" " 3 " " " " " " " " " East Wing.
" " 3 " " " " " " " " " Garage
" " 3 " " " " " " " Heating Feeder—Main Bldg.
" " 3 " " " " " " " " " West Wing.
" " 3 " " " " " " " " " East Wing.

On back of panel the bus bars, supports, lugs, etc., necessary to make board complete.

All metal parts on face of board to be highly polished and lacquered.

Bus bars to be built up of flat copper, figured on a basis of 1000 amperes, per square inch carrying capacity and so designed and of sufficient width to provide one square inch of contact for each 75 amps. They shall be neatly arranged and securely and rigidly supported in place.

Provide on face of panel under each switch a neat black fibre name plate, showing feeder controlled. Letters on these plates to be not less than ⅜ inch high, distinctly recessed and filled with white enamel.

Above the marble panel provide and securely bolt to frame and braces an angle iron frame properly designed and drilled to receive 3 meters. Run the necessary meter loops for lighting company's connection.

This contractor shall submit to the architect a scale drawing in duplicate showing both front and rear of board and must obtain his approval before work is started.

Feeders.—From the above described main switchboard to the various panel boards hereinafter specified, run the following feeders.

No. 1—3-wire No. .... B. S. G. in....Conduit to Power Panel.
No. 2—3 " No. .... " " " "....Conduit to Heating Section of panels —Main Bldg.
No. 3—3 " No. .... " " " "....Conduit to Heating Section of panels —West Wing.
No. 4—3 " No. .... " " " "....Conduit to Heating Section of panels —East Wing.
No. 5—3 " No. .... " " " "....Conduit to Lighting Section of panels —Main Bldg.
No. 6—3 " No. .... " " " "....Conduit to Lighting Section of panels —West Wing.
No. 7—3 " No. .... " " " "....Conduit to Lighting Section of panels —East Wing.
No. 8—3 " No. .... " " " "....Conduit to Lighting panel in garage.

Feeder conduits to run open across basement ceiling and up raceway provided and shown on plans.

Panel Boards and Cabinets.—Furnish and install where shown on plans the following panel boards:

Panels "A," "B" and "C" in main building.
Panels "D," "E" and "F" in west wing.
Panels "G," "H" and "I" in east wing.
Panels "J" in garage.
Panels "K" for power in main building.

Panel boards shall be of polished Alaska marble, of good quality, free from mineral veins and of ample size to accommodate the equipment specified to be mounted thereon. These panels except the garage and power panel, to be arranged in two sections, the upper part for lighting and to be fed from the lighting feeder, the lower for heating and to be fed from the heating feeder.

Provide on face of board a 30 amp. panel type fused knife switch for each circuit. Switches for lighting circuits to be double pole and either double or triple pole, as required, for the heating circuits.

Switches on power panel to be 220-volt, 3-pole fused.

All switches and fuses to be properly bussed to connecting lugs, bus bars to be of flat copper on face of board and all to be highly polished and lacquered.

Each circuit shall be numbered on bus bar opposite switch and a neat schedule provided showing circuits controlled.

Provide a lining around edge of board, of the same material as board, polished and of sufficient depth to fill space between face of board and inside of door.

These panel boards to be enclosed in metal cabinets large enough to provide a gutter of at least 2 inches on all four sides of board and of ample depth to allow door to close when switches are open.

Cabinets to be built of No. 14 U. S. G. galvanized iron securely riveted to angle iron frame.

Cabinet doors and trim will be furnished and hung by the owner.

Conduits.—All conduit used in connection with this work shall be either "Eagle Brand," Pittsburgh Standard Galvanized," "Sherarduct," "Zinkote," or "X duct," or as listed and approved by the Southern California Chapter, American Institute of Architects, rigid galvanized or sherardized with the maker's name and trade mark clearly stamped on each length.

All conduits must be continuous and extend from outlet to outlet, ends reamed smooth and carefully butted in couplings.

Where conduits terminate in boxes they shall be securely fastened and provided with approved bushing. At all other points, as at switchboard, motors, etc., conduits must terminate in proper condulets or taplets.

Conduit sizes to be according to the "Standard List of Conduit Sizes," as published by the National Electrical Contractors' Association, and shall be installed in accordance with Section 28 1915 Code, except that plates will not be permitted.

Wire.—All wire used in connection with this work shall be either "Raven Core," "G. E. Red Core," "Simcore," "N. I. R." or "Roeblings," or listed and approved by the Southern California Chapter, American Institute of Architects, new Code, double braid, unless otherwise stipulated in 1915 Code, rubber covered, and shall be delivered on the work in original packages with manufacturer's tag on each coil.

For the power, heating and lighting work, no smaller wire than No. 14 B. & S. G. shall be used, all wire larger than No. 8 B. & S. G. must be stranded and in wires or cables having more than one conductor, the conductors must be parallel, and each conductor shall be insulated and braided, or taped, separately with an outer braid over all. Concentric wires will not be permitted or accepted.

For the telphone and bell work, wire to be rubber covered, braided and twisted inside wire or double silk and single cotton insulated and braided switchboard cable, twisted in pairs and having a distinct color scheme. In underground work this cable to be encased in a 3/32 inch lead sheath.

Wire in conduit must be continuous from outlet to outlet, as no splices will be permitted in the conduit, and shall not be pulled in until after the plaster is on and dry.

Boxes.—At every outlet provide an approved galvanized or sherardized outlet box.

All boxes used in connection with this work to be listed and approved by the Southern California Chapter, American Institute of Architects.

Boxes must be securely fastened in place, by suitable hanger or support, independently of the conduit piping. Locknuts on conduits will not be considered as filling this requirement.

Outer edge of face of box to be flush with surface of wall or ceiling and must be so installed as to leave no open space

or gap around the edge or sides. When the surface at any outlet is broken it must be repaired so as to leave no holes or open spaces at outlets.

Light outlet boxes shall be a standard 4 inch box fitted with plaster ring and must be provided with an approved stem or stud threaded for ⅜ inch standard pipe. This stem must be securely fastened to box by at least four bolts, and should enter box from back.

Should the contractor use a box larger than the standard 4 inch round box, it must be provided with a cover and this cover must be provided with lugs taped for screw threads.

Flush Switches.—Furnish and install, where shown on drawings, or hereinafter specified, "H. & H.," "Perkins," "G. E.," "Cutler-Hammer," "Arrow E," flush push button type switches, of the best grade of their respective make, competition switches will not be accepted, to control lights as indicated on plans. Plates must be of brass, finished to match hardware and not less than 60 mils in thickness.

Where more than one switch comes in the same location they shall be provided with gang plates, and plate must be engraved to show lights controlled. All switches and plates must be set flush and true with wall and trim.

Receptacles.—Furnish and install where shown on lighting plans or herein specified, Edison screw plug double hinged door type flush receptacles. All lighting receptacles, unless otherwise shown, to be wired for 120 watts each.

At each heating outlet shown or herein specified provide a 25 amp. flush receptacle, either double pole or triple pole as indicated and each wired on a separate circuit of not smaller than No. 8 B. & S. G. wire.

Receptacles for iron where indicated, to be of the indicating type, indicator to burn only when plug is inserted, and each to be wired on a circuit of not smaller than No. 12 B. & S. G. wire.

All receptacles to be provided with brass plates, not less than 60 mils in thickness and finished to match hardware. Receptacles and plates must be set flush and true with wall and trim.

Knife Switches.—All knife switches called for herein to be of the best grade, polished, and only such switches may be used as are listed and approved by the Southern California Chapter, American Institute of Architects.

Fuses.—Provide one complete set of fuses.

Fuses on panel board to be of the plug type, and on switchboard to be of enclosed type as provided in Code Rule 68-F.

Only such fuses may be used as are listed and approved by the Southern California Chapter, American Institute of Architects.

Motor Circuits.—From the power panel board to the various locations shown on plans, this contractor shall run 220-volt, 3-wire, 3-phase motor circuit to the following motors:

One 1 h.p. for boiler.

One 5 h.p. for vacuum cleaner.

Two 3 h.p. in laundry.

At each of these motors, except vacuum cleaner, this contractor shall install one enclosed type 3-pole, fused knife switch for motor control. From this knife switch this contractor shall install conduits and wires and make motor connections.

Vacuum Cleaner Motor and Control.—Provide at location of vacuum cleaner motor in basement a Hart or G. E. remote control switch and operate from combination momentary contact switch and bulls eye receptacles placed at each cleaner outlet marked "V. C." on plans.

Do all wiring and furnish all electrical material in connection with the vacuum cleaner motor and above switches, using the same grade of material as specified above and taking motor circuit from power panel board.

Telephones.—Provide all material and equipment and install an inter-communicating telephone system, consisting of seven selective ringing, selective talking, automatic, non-interfering telephone sets, each to be fully equipped and wired, each set to be provided with a retardation coil of high impedence and of at least 100 ohms resistance and the bells, transmitters, and receivers to be of the high resistance type.

Telephone circuits to be full metallic and number of conductors to be as required.

Telephones to be located where shown on plans and type of set to be as indicated.

All conductors must be continuous from outlet to outlet as no splices or joints of any description will be allowed, except in outlet or terminal boxes.

All connections in the cables or between rubber covered wire and cable shall be made by means of soldered terminal strips enclosed in proper size boxes. The wires leading to the terminals must be properly formed and taped or laced and ends of cables thoroughly saturated with compound to prevent the absorption of moisture. These terminal strips may be placed in the telephone outlet box, using the telephone for cover, in which case a sufficient length of flexible wire must be used to permit the telephone being moved without disconnecting. Splices may be made in the rubber covered wire without the use of terminal strips, providing there are not to exceed five pairs in the box where splice is made.

Conduit sizes to be in accordance with the N. E. C. A. conduit chart.

Boxes shall be provided at all outlets and must be large enough to prevent crowding of wires and cables.

Provide and properly connect the necessary dry cell battery to operate the system in a satisfactory manner. Battery to be enclosed in a neat battery box and located in basement where shown.

Bells.—This contractor will provide all materials and equipment and install a complete call bel system, consisting of a 10-drop flush wall type automatic reset annunciator and the buzzers and push buttons shown on plans or herein specified.

System to be fully wired and annunciator drops connected to operate from push buttons shown.

Provide in each dining room a floor push, located as directed and connected to operate buzzers in kitchen.

Push button at all exterior doors to match in design, finish and workmanship door hardware. Interior push buttons to be of cast brass or bronze, design and finish to be selected by the architect.

Bells or buzzers in the same general location must be of decidedly different tone and all bells and buzzers must be of the best grade and equipped with spiral spring and screw adjustment.

Annunciator to be metal front flush type, finish as selected and to be of an approved make.

Provide and place in telephone battery box sufficient dry cell battery to operate system in satisfactory manner.

ELECTRIC APPLIANCES GAIN FAVOR IN VENEZUELA.

On account of the fact that coal is not now obtainable here at a reasonable price, and that wood fuel is uncertain—it is almost impossible to cut it during the rainy season—the owners of saw-mills, grist mills, hat factories, bakeries, pumping establishments and numerous other small industries have shown increasing interest in electric power and heating devices since the electric company decided to supply power during the day. There is a good opening for all kinds of electrical appliances for domestic and industrial use, such as fans, stoves, irons, large ovens for bakeries, motor-driven pumping outfits for private houses, motors of 1 to 25 h.p., etc.

SPARKS—CURRENT FACTS, FIGURES AND FANCY

In December the great Canadian Pacific railroad tunnel under the Selkirks in the Rockies will be open for service. The project, when finished, will have cost twelve million dollars.

* * *

In a recent copper ore test of a new electric smelter at St. John's, Newfoundland, a high grade of copper was produced. The plant has a capacity of about 1000 pounds of ore per hour.

* * *

Theatrical cream is said to be a boon to the wiremen or anyone who has to handle wire with black, sticky insulation. Many electricians use gasoline, washing powder, etc., which commonly results in chapped and sore hands.

* * *

The manufacture of dyes from the waste of Osage orange wood to the extent of seven hundred and fifty thousand dollars' worth a year is now carried on in the United States. This should be an electrical industry of the West rather than of the East as it is at present.

* * *

Jovianism at the recent Indianapolis convention received an unprecedented further awakening. With Henry L. Doherty as Reigning Jupiter and an enthusiastic membership of over nineteen thousand strong backing him great things are anticipated for the near future.

* * *

During last July it is estimated that ten miles of ships passed through the Panama Canal. In all, there were one hundred and forty-nine ships. The Siberia and Korea, familiar to Pacific Coast cities, possessed the greatest length, each being five hundred and fifty-two feet long.

* * *

The recently patented electrical ticket selling machines for the movies, now so popular in America seem to have no future in Russia. This is due to the fact that regulations for collecting internal revenue in that country necessitate the issuance of ticket stub books to theatre managers by the local governmental authorities.

* * *

Perhaps no subject has received greater engineering discussion than that of a tunnel under the English channel. It is now proposed by a distinguished English engineer that the tunnel be constructed in two tubes at a depth in the chalk bottom of the channel of one hundred and fifty feet below the channel bottom. It is estimated six years will be necessary in its completion.

* * *

A question which is of great interest to many municipalities is the extent to which some form of motor bus can be used to supplement the existing street car service; in outlying districts, for instance, which it is desired to connect with the existing lines, but where it is not practicable to build expensive extensions under present conditions.

* * *

A cyclo-harmonograph, an instrument for drawing a large class of curves in higher mathematics, has just been invented by the professor of mathematics at the University of Washington. It is expected that the instrument will find a wide application among designers and architects as it draws a great variety of rosettes and foliate curves.

* * *

Electricity has been making great strides in India. Local electric works advertise to furnish current not only for lighting but for mechanical uses. A big future is seen in the domain of the small engine. These engines are especially employed at present in the grinding of flour made of wheat and millet of which the native chapatties or cakes are made.

* * *

Gramaphone records are now being made which reproduce the Morse signals as they appear in the microphone of a wireless receiver. These records commence with the simple Morse code and pass on to dummy messages, including figures, fractions, stock exchange terms, and other items of importance in the commercial and financial world.

* * *

Investigations in rate-fixing of public utilities have brought to light the interesting fact that the cost per unit output of steam and electrical machinery of given speed decreases as the capacity increases. In considering the depreciation of this equipment, on the other hand, the inverse is found to be true; namely, the depreciation increases with the capacity.

* * *

The diversity factor of electric cooking has been found to be about 1 to 7, though it is considered safe practice to figure on a ratio of 1 to 10, as the maximum demand of the cooking load seldom occurs at this time of the station peak. This permits the installation of at least seven times as many ranges on a distributing system as the connected load would seem to indicate.

* * *

With the rapid shortening of the days, the electric expedient of a Cincinnati poultry man will appeal to others interested in the business. At five each morning the inventor turns an electric switch in his bedroom and the hen house is flooded with brilliant illumination. The inmates, under the impression that dawn has broken suddenly though unaccountably, proceed to the day's activities, with the result that appreciable headway has been gained by the time neighboring roosts awaken. By five in the afternoon, when day starts waning, the same thing is repeated. For two hours, more or less, these hens continue to scratch and lay while their neighbors are perched in dreamland. The eggs produced equal in number the record of the longest days in summer.

JOURNAL OF ELECTRICITY
POWER AND GAS

FOUNDED 1887

PUBLISHED WEEKLY BY THE

Technical Publishing Company

Crossley Building, San Francisco

ON LIBRARY CARS OF ALL SOUTHERN PACIFIC TRAINS

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico	per year,	$2.50
Dominion of Canada	" "	3.50
Other Foreign Countries within the Postal Union	" "	5.00
Single Copies, Current Month	each,	.25

NOTICE TO ADVERTISERS.

Change of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

CONTENTS

The Most Powerful Gold Dredge Afloat 371
By Robert Sibley.

Safetygrams 374

Pasturing Sheep on Canal Banks 375

Electric Power Transmission in Logging 374
By Allen E. Ransom.

Care of Farm Ditches 375

Domestic Lamp Socket Heating Devices 376
By E. A. Wilcox.

Standard Electrical Specifications 378
By H. Conger Bowers.

Electric Appliances Gain Favor in Venezuela 380

Sparks—Current Facts, Figures and Fancy 381

Editorials 382
Electrical Operation of Gold Dredges.
Standard Specifications
A Bureau of Governmental Research.

Personals 384

Meeting Notices 384

Trade Notes 384

News of California Railroad Commission 385

News of California Water Commission 385

New Catalogues 385

Book Review 385

News Notes 386

Electrical Operation of Gold Dredges

The all-steel, electrically-driven Yuba No. 15, described on another page of this issue, marks again a definite advance in the art of gold dredging in the West.

The construction of the first gold dredge in California in 1898 heralded the beginning of a new era in gold mining. Since that period the rapid advances made in gold dredging and the gradual increase of gold output in that commonwealth have gone hand in hand with improvements and enlarged construction in gold dredges. As a consequence the fifty-eight operating dredges in the gold-bearing districts of that region make the California gold dredge today the model after which other countries pattern.

In this period of less than two decades the gold dredge has evolved from the steam-shovel-placed-on-a-raft idea to the giant steel clad monster of the Yuba No. 15 type, that scoops up 300,000 cubic yards of gold-bearing gravel each month, while operating to a depth of 84 ft. beneath the surface.

It is interesting to note, too, that electricity is playing an ever widening importance in the operation of the gold dredge. The earlier type of dredge boasted but some hundred and fifty horsepower of installed capacity, while this most recent creation has an installed capacity of over one thousand horsepower.

But the most remarkable advance is to be found in the manner in which the electrical equipment is installed upon the dredge.

Some two years ago the installation of Yuba No. 14, at that time the most powerful and well equipped dredge in existence, utilized a motor of four hundred horsepower as the main drive. The contactor equipment was provided with inverse time limit overload control for alternating current operation. Since the installation of this dredge, however, it has been found that certain fluctuations are felt on the alternating current operated control due to the unevenness of operation of the digging motor. This condition of affairs is entirely avoided on the Yuba No. 15 by having the contactor control for the 500 h.p. main drive motor operated by direct current from a motor generator set installed on the boat.

Other things that commend themselves in the design are the safety features that have been carefully worked out. The switchboard fronts are practically "dead front" in every particular.

Thus throughout the entire work the first idea has been not only to attain increased efficiency in operation but also to protect the operator as far as is reasonably possible from coming in contact with the live parts.

A gold dredge is in actual operation between 85 and 88 per cent of the total time, since the dredge operates night and day with three shifts. The load factor varies from 62 per cent to 80 per cent, depending on the character of ground.

California has since the days of 1848 produced almost one and two-thirds billions of dollars in gold. Last year over one-third of her entire gold output came from the fifty-eight dredges operating within her confines. The increased economy in dredge operation under high class design means much to the future of this activity in the West. At the same time this ever increasing load for the hydroelectric companies of the West

from this source means a continued prosperity for hydro-electric enterprises.

Standard Specifications

One of the chief needs of the electrical contractor has been closer co-operation with the architect. The architect is the planner, the contractor the doer. Upon their co-ordinated efforts depends the satisfaction of the owner. Heretofore both contractor and architect have been too far apart in their ideas to insure that the owner will also be pleased.

In the first place, it is a lamentable fact that the electrical equipment is too often the first to be curtailed when consideration is given to cutting the cost of a proposed building. The number of outlets is minimized, baseboard receptacles are omitted and adequate provision for electrical conveniences is neglected. As a result the average house has barely enough lighting fixtures, and no opportunity for utilizing electric heat and power in the home or office. Considering the well-nigh universal use of the electric iron, the large number of washing machines and vacuum cleaners and the serious limitations of lamp-socket circuits on all heating appliances, it is high time to wire every home for electric heat and power utilization as well as for lighting.

Then, again, even when the architect provides for these electrical conveniences, he is sometimes at a loss in preparing the specifications. With so many highly specialized branches of construction—mechanical, electrical and sanitary—it is too much to expect an architect to be an expert in every line. The specifications are therefore frequently hazy regarding important details and their interpretation causes needless friction.

For the contractor to furnish specifications is an unfair burden for him to bear, and likely to prove unsatisfactory to the owner.

The first step in the solution of this problem is for the architect to employ an electrical engineer to prepare the specifications. The architect thus protects his reputation and his client, the contractor is enabled to make an intelligent bid and the owner is assured a good job.

But, as time goes on, it is found that many jobs are so similar that only minor changes are necessary to adapt the specifications for one installation to another. It becomes possible to use standard specifications.

Recognizing this fact, several manufacturers have served the architect by supplying him with specifications to meet required conditions. But because of the suspicion that certain makes of material will be specified to the exclusion of other meritorious brands, this practice does not always meet with favor.

Consequently the standard specifications prepared for the use of Los Angeles contractors and architects by Mr. H. Conger Bowers, as printed elsewhere in these columns, is of considerable interest and value. They allow a wide latitude in the choice of approved materials. Emphasis is placed upon quality rather than upon the manufacturer. The architect is greatly assisted by their use and every branch of the industry is benefited.

A Bureau of Governmental Research

The past week has seen the inauguration of a public-spirited movement in one of the cities of the West that cannot fail in bringing forth the hearty commendation of all the well-wishers of this growing section of our country. Reference is made to the launching, through private guarantees, of a San Francisco Bureau of Governmental Research. Thus far the movement has received the full endorsement of the mayor of the city and it is backed financially to the extent of one hundred thousand dollars in pledges. It is organized to be active for at least a period of five years. The names of the men back of this enterprise are in themselves sufficient guarantee that the founding of this research bureau will be on the broadest lines possible.

Economic and unified government in American cities is the appalling need of the hour. So complex has grown the running of municipal affairs and to such enormous proportions has become the annual budget outlay that the coming to light of gross misjudgment in such matters, often involving hundreds of thousands of dollars in expenditure, is almost a matter of daily occurrence in some city of America.

Since city funds are in a large measure spent in the construction of municipal enterprises, such as fire protection, water supply, or lighting and power development, the engineering features of municipal effort too often prove biased in judgment and lacking in harmonious, unified design.

Of all the problems that confront a municipality, that of economic development of its engineering features are by far the most important. If ever a judgment absolutely freed from political influence is needed, surely in the solution of these problems its need is paramount.

That a beginning is to be made in a Western city looking toward the solution of municipal problems by means of a privately endowed bureau of research is indeed a source of congratulation. The movement deserves the moral support of all who are interested in the evolution of clean, economic city government.

And, too, this movement should go further than the confines of a municipality. In California, alone, the issuance of state, county and municipal bonds now totals almost a quarter of a billion dollars. This means that the citizens of this commonwealth have to meet in interest charges alone an annual outlay of ten million dollars. Conservative bankers estimate that in less than a decade this bonded indebtedness will probably be twice its present enormous totals.

It is high time, then, that citizens of the various commonwealths of the West should be seriously devising means whereby the truth may be freely and impartially searched out in civic problems of city, county and commonwealth. Of course, it goes without saying that those employed in such work should be of the highest fitness in attainments and in every way free to give the matter the most painstaking and searching investigation, independent of any undue private, public or political influence.

It is believed that the ethics of the West are pure enough in their conception to attain this ideal, and no stone should be left unturned to arouse the public conscience to the necessity of research in every department of Western civic activity.

PERSONALS

F. G. Baum, consulting engineer at San Francisco, is in New York City.

Carl Stradley, chief engineer of the Oregon Short Line Railroad, was a recent visitor at San Francisco.

W. D'A. Ryan, lighting expert of the General Electric Company; and **A. F. Dickerson,** his assistant, are at Los Angeles.

E. B. Strong, president of the Technical Publishing Company, has returned from an extended business trip throughout the East.

E. B. Walthall, assistant general manager San Joaquin Light & Power Corporation, has returned to Fresno, Cal., from San Francisco.

H. H. Hughes, sales engineer Westinghouse Electric & Manufacturing Company of Fresno, spent a few days this week at San Francisco.

R. D. Holabird of the Holabird-Reynolds Company, has returned to San Francisco from an extended business trip throughout the East.

W. L. Goodwin, vice-president and general sales manager of the Pacific States Electric Company, has returned to San Francisco from an extended Eastern trip.

George Sanford, manager of the Great Western Power Company at Rio Vista, was a business visitor at San Francisco during the week.

C. J. Thelen, with the Electric Railway & Manufacturers' Supply Company, is making a business trip throughout the northern part of California.

Adolph Sprauch, head of heating sales of the Pacific Gas & Electric Company, has returned to San Francisco after a short business trip to Newcastle.

G. Douglas Jones has resigned as electrical engineer with the California State Engineer's office, after six years' service, in order to enter business for himself.

D. E. Harris, who has been district sales manager of the Pacific States Electric Company for many years, has been elected a vice-president of that company.

S. H. Taylor, president of the Electric Railway & Manufacturing Supply Company, expects to leave for an extended business trip throughout the East shortly.

Ellery A. Baker, vice-president and assistant general manager Rathbone, Sard & Co., manufacturers of electric ranges, was at San Francisco during the past week.

H. H. Hoxie, sales manager of the Electric Railway & Manufacturers' Supply Company, has returned to San Francisco from a ten days trip to Los Angeles and the Southwest.

E. K. Johnson, formerly with the Pacific States Electric Company, has recently joined the sales force of the Electric Railway & Manufacturers' Supply Company of San Francisco.

H. P. Pitts, commercial engineer Pacific Gas & Electric Company, left San Francisco this week to attend the convention of the National Commercial Gas Association at Atlantic City.

B. J. Klein, Pacific Coast representative of the Bristol Company, of Waterbury, Conn., will return from an extended trip throughout the Pacific Northwest about the last of next week.

Henry F. Holland, formerly Pacific Coast manager of the Simplex Electric Heating Company, has recently been appointed heating specialist for the Great Western Power Company at San Francisco.

Max Thelen, president of the California Railroad Commission, and Commissioner Edwin O. Edgerton, are attending the twenty-eighth annual convention of the National Association of Railway Commissioners at Washington, D. C.

MEETING NOTICES.

San Francisco Development and Jovian League.

R. F. Behan, "assistant to the Westinghouse Company," was chairman of the day at the November 1st meeting. After T. E. Bibbins and N. J. Pendegast had spoken briefly on some of the amendments to be voted on at the coming election and A. H. Halloran had explained the advantage of local advertising during America's Electrical Week, Mr. Behan in a few well-chosen words introduced Dr. I. M. Rubinow of the Social Insurance Commission as speaker of the day. As at a previous meeting the subject of social insurance had been subject to vigorous attack by Dr. Marsh. Dr. Rubinow spoke in its defense. He particularly urged its adoption as a substitute for present day charity methods in caring for sickness. He briefly traced its early foreign history and told of the success of the plan in Liepsic and other cities on the continent. He mentioned the augmented interest in the subject in this country and stated that the problem is one which must be solved jointly by industry and general society. Upon industry he placed the responsibility for much of the sickness of working people and consequently the burden of its alleviation. The speaker stated that social insurance had been in operation for 35 years in Europe and that it was not too late for California to take the step.

Los Angeles Jovian Electric League.

A highly interesting and instructive lecture, illustrated with lantern slides, was delivered at the luncheon November 1st by A. A. Schmidt and E. R. Wolcott, representatives of the Western Precipitation Company. Their subject, "Commercial Use of Electricity as Applied to Precipitation," highly technical and covering a subject little understood by the average individual—deals with the removal of suspended particles from gases by the use of high-potential electrical discharges, resulting in the abatement of smoke fumes and dust, and conserving the particles collected, which are used as by-products for fertilizer, etc. Mr. Schmidt stated that the precipitation process is rapidly finding favor with the larger chemical and metallurgical works, cement mills, and smelters throughout the country, and he stated further that in one plant alone 90 to 100 tons of dust per 24 hours are collected and used as potash fertilizer. H. B. Woodill introduced Mr. E. P. Judah, president of the Merchants' & Manufacturers' Association, who gave a short and interesting talk, and he was followed by the reading of a letter from Thomas A. Edison, acknowledging the greetings extended by the Jovian League. On motion of James Colkitt, it was voted to send a letter of greeting with the best wishes of the league to Murray Orrick, of San Francisco, the new Statesman for California. First Tribune Harry N. Sessions then announced a rejuvenation to be held December 8th.

At a business meeting held previous to the regular meeting, the following were appointed on the membership committee by President Morphy. Harry N. Sessions, chairman; K. E. Van Kuran, J. O. Case, W. J. Barman, I. R. Solomon, C. T. Carr, C. E. Cayot, A. B. Day, R. L. DeCamp, H. P. Hubbard, James Irvine, J. A. Rogan, F. B. Nightingale, F. J. Royer, E. Woodbury, George A. Vedder, Fred Lasher.

H. H. Fogwell, of the Westinghouse Electric & Manufacturing Company, as chairman of the day, furnished the program.

TRADE NOTES.

The domestic science department of the Oregon Normal School at Monmouth, Ore., will install a complete outfit of electric cooking appliances. A rock crusher operated by the city of Dallas has been moved from an outlying point into the city. It will be served electrically by the Oregon Power Company. The High School at Independence has installed a 3 h.p. ventilating fan motor.

Western States Gas & Electric Company of Stockton, Cal., has secured a contract with the Samson Sieve-Grip Tractor Company for electric energy to operate a ¾-ton electric furnace. This is the second electric furnace installation in that city, the first being installed several months ago at the Monarch Foundry Company, which is also served by the Western States Company. Other new business recently secured by the Stockton division includes a larger power installation for the operation of the gold dredger for the Natomas Company, which sank its pond in the spring.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The Commission has approved the merger of the Home Telephone Company of Los Angeles with the Pacific Telephone & Telegraph Company.

Coast Counties Gas & Electric Company has filed a complaint, stating that the Sierra & San Francisco Power Company is encroaching on its territory by constructing lines preparatory to distributing electric energy to the Old Mission Portland Cement Company, in the neighborhood of San Juan Bautista, San Benito county.

Attorney William Simmons, representing minority stockholders of the Central California Gas Company, of which C. S. S. Forney is president, has asked Commissioner Gordon to have the accounts of the gas company investigated before the commission passed upon the application of the company for authority to issue $87,000 of prior preferred stock. Commissioner Gordon asked Simmons if he wanted the commission to allow the company to go into receivership, which would be the case if the commission should refuse to permit of financing necessary to pay $12,000 on bond interest. Simmons replied that he did not believe a receivership was necessary. The application was submitted for the consideration of the commission.

The H. G. Lacey Company and the Mount Whitney Power & Electric Company has filed with the Railroad Commission a joint application for authority for the Lacey Company to sell its electric plant and system at Hanford, Kings county, to the Mount Whitney Company for $150,000.

F. Hammond, complainant against the Tujunga Water & Power Company of Los Angeles county, has asked the commission for a rehearing of its decision which dismissed his original complaint. Hammond wants the company to furnish him with irrigating water, which he says the company refuses on the ground of inadequate supply. He says the company has plenty of water, and that if it will not furnish the water that the commission should order it put into the hands of a receiver.

NEWS OF CALIFORNIA WATER COMMISSION.

E. W. Pereira of Ft. Jones has applied for permission to appropriate 125 cu. ft. per second of the waters of Scott River, tributary to the Klamath River, in Siskiyou County, for agricultural purposes. There is a proposed main canal 7 miles long and a cement dam 8 ft. high, 60 ft. on top and 35 ft. on bottom, the works to cost, as estimated, $48,500. Ten thousand acres are sought to be brought under the ditches.

J. F. Carney of Montgomery Creek, Shasta County, has applied for permission to appropriate for agricultural purposes five cu. ft. per second of the waters of Hatchet Creek, tributary to Pit River, in the above county. A main ditch 4 miles long is proposed to convey the water to 200 acres at an estimated cost of $1000.

Arnold J. Claussen of Alturas has applied for permission to appropriate 560 acre feet per annum of the water of Portage Flat drainage area and Canyon Creek, tributary to Pit River, for irrigation purposes. There is proposed a main ditch 2½ miles long to water 127 acres at an estimated cost of $1000.

UNIVERSITY EXTENSION COURSES IN ELECTRICITY AND CHEMISTRY.

University extension courses in electricity and chemistry were inaugurated in San Francisco at the Polytechnic High School, Frederick street, near First avenue, on Friday evening, November 3d. This is a new opportunity for those interested in taking these subjects and its inauguration should be welcomed by a large enrollment.

NEW CATALOGUES.

Wm. B. Scaife & Sons Company of Pittsburgh has just issued a booklet of thirty-two pages on filtration. The publication deals with water purification.

"Melting Aluminum Chips" is the subject matter of Bulletin 108 just issued by the U. S. Bureau of Mines. "The Use of Mud-Laden Fluid in Oil and Gas Wells" is likewise the subject matter for Bulletin 134.

"The Wire Message" is a new monthly house organ published for free distribution by Habirshaw Electric Cable Company, Inc., and The Electric Cable Company, 10 East Forty-third street, New York. Its purpose is to present timely information regarding the wire and cable trade.

"Your Christmas Campaign From Westinghouse" is the subject of a large folder and accompanying literature being supplied to electrical dealers by the Westinghouse Electric & Manufacturing Company. The folder reproduces four pages to appear in the Saturday Evening Post during November and December, and illustrates and describes various means for tying in locally with the national campaign. These include a Christmas folder to be mailed to consumers, street-car cards, the billboard posters, window cutout, window cards and lantern slides.

The Cutler-Hammer Manufacturing Company of Milwaukee has just distributed to the electrical trade a large broadside devoted to the publicity campaign on the C-H push socket. This broadside shows an illustration of a large display cutout, which is given free to electrical dealers and contractors. It also contains reproductions from pages of the various publications in which advertisements are being carried, which include the Saturday Evening Post, Literary Digest, Factory, and the electrical papers. The big display in this broadside shows a series of nine advertisements which are carrying the message about the C-H push socket to thousands of homes, factories and the entire electrical industry. The broadside points out some of the advantages of the push type sockets of 660 watts capacity.

"Magnetic Switch Control Apparatus" is the title of the new booklet M published by the Cutler-Hammer Manufacturing Company of Milwaukee, describing alternating and direct current types of magnetic switch control apparatus. In this 32-page booklet there are 79 illustrations showing the apparatus as well as installation of this apparatus. The systems of automatic or magnetic switch types of control are clearly explained. Among other subjects a complete description of the new magnetic lockout switch is included. In the alternating current section air brake and oil brake types of switches are shown and described. This booklet should be of considerable value to all interested in industrial applications.

BOOK REVIEW.

How to Make Low Pressure Transformers. By F. E. Austin. Size 5x8 in.; 24 pp.; 16 illustrations; cloth binding. Published by F. E. Austin of Hanover, N. H., and for sale at the Technical Book Shop, San Francisco. Price, 40 cents.

This is the third edition of this little booklet written by Professor Austin. Its written matter well carries out the title of the work, and the booklet should continue to have the popularity it has hitherto enjoyed.

NEWS NOTES

INCORPORATIONS.

LONG BEACH, CAL.—The Molander Power Company has been incorporated for $1,000,000. Officers of the company, having headquarters here, are: H. P. Molander, president; J. E. Craddick, first vice-president; W. B. Weiss, second vice-president, and E. A. Wilson, secretary-treasurer. Work has been started on the end of Long Beach pleasure pier for the construction of a $25,000 plant for the company, which is to produce electric power from wave motor equipment.

ILLUMINATION.

SPARKS, NEV.—Plans for putting in street lights on B street are being considered by the city council.

NEWPORT, CAL.—The city trustees have instructed the electrician to install twelve street lights on Balboa Island at a cost of $196.

DOUGLAS, ARIZ.—Three complaints have been presented to the city council on the proposed assessment of the G avenue lighting system.

VISALIA, CAL.—The trustees have passed a resolution declaring it their purpose to call for bids for an electrolier system on West Main street.

CLE ELUM, WASH.—South Cle Elum has awarded the contract for its new electric lighting system to C. H. E. Williams, Seattle, at $4070.

BOISE, IDAHO.—The Idaho Power Company has been granted permission by the public utilities commission to construct and operate an electric light system in Filer.

TACOMA, WASH.—An ordinance has been passed by the council providing for the purchase of incandescent electric lamps to the value of $20,000, and making an appropriation therefor.

ANCHORAGE, ALASKA.—It is announced that the lighting plant authorized by Chairman Edes of the Alaskan Engineering Commission will be in operation by the first of January, 1917.

LOS ANGELES, CAL.—At a meeting of the Mount Washington Improvement Association the installation of ornamental lighting posts along the road up Mt. Washington was advocated and work will begin soon.

PORT ANGELES, WASH.—The city council has laid over the awarding of the contract for electrical supplies for the city light extensions until progress is made in the completion of the sale of the $25,000 bond issue.

BOZEMAN, MONT.—R. W. Leslie of Chicago, has made application to the city council of this city for a franchise to supply the city with gas. He proposes to spend $150,000 in putting up a plant and laying 12 miles of mains.

PORTLAND, ORE.—Electric light fixtures on the interstate bridge will cost $11,724. The contract has been let to the Pacific States Electric Company and the United States Products Company for posts, brackets, wiring and copper conduits, transformers and time switches.

LOS ANGELES, CAL.—An ordinance has been adopted by the city council for the installation and maintenace of the necessary Marbelite centrifugally made reinforced concrete ornamental lighting posts and appliances for the lighting of 55th street, between Budlong avenue to Normandie avenue.

LOS ANGELES, CAL.—Walter D'Arcy Ryan, illumination engineer, is in Los Angeles to design a system of illumination for the main business streets of the city. He is accompanied by A. F. Dickerson and their staff will at once begin planning for the first unit of the system which will be installed on Broadway between First and Tenth streets.

POCATELLO, IDAHO.—The committee, appointed from the council to investigate the proposition of Joseph Burns, in regard to the installation of a municipal light plant, reported at a recent council meeting that the members had visited the proposed site and found it feasible for a power plant to furnish the city with 200 kilowatts daily.

TRANSMISSION.

MARSHFIELD, ORE.—The Eastside city council has granted the Oregon Power Company an electric franchise for 25 years.

BOISE, IDAHO.—The Mackay Light & Power Company has written the public utilities commission regarding plans for the extension of its service to Pioneer.

BREMERTON, WASH.—Plans and specifications have been prepared for the new power line connecting the navy yard and Keyport by telephone. The cost will be about $10,000.

EASTSIDE, ORE.—The Oregon Power Company has been granted a 25 year franchise to supply current for both light and power. Extension of power lines to this place must begin in 60 days.

DAVENPORT, WASH.—The Washington Water Power Company of Spokane has petitioned the commissioners for a franchise to construct a transmission line over certain roads in Lincoln county.

EVERETT, WASH.—The Snohomish county commissioners granted a franchise to the Washington Utilities Company for the construction of light and power lines from Norman to Florence, thence to Stanwood.

ST. ANTHONY, IDAHO.—It is reported that work will soon begin on the construction of an electric line between Ashton and Preston, connecting with the electric road at the latter place. The Pocatello Traction Company will construct the road.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company and subsidiary companies propose to spend $1,215,000 for reconstruction and extension work the coming year. This will include track and trestle work, paving, overhead service, light and power plants and other work.

EVERETT, WASH.—The county commissioners have signed the franchise giving the Washington Utilities Company the right to construct an electric power line along the road running from Norman through Florence to Stanwood. The Utilities Company recently took over the holdings of the Jim Creek Water, Light & Power Company. The work will cost about $15,000.

RIALTO, CAL.—Work on the construction of a power plant to supply Fontana and Rialto with electrical energy and four and a half mile pipe line to the plant from Lytle Creek will start at once, it is announced. The work will be done under the direction of McMeen & Miller, Chicago engineers. The Western Pipe & Steel Company will furnish the pipe. The sum of $375,000 will be expended on the work.

SAN LUIS OBISPO, CAL.—The Midland Counties Public Service Corporation is preparing to extend its power lines in various parts of this and Santa Barbara county. It is reported the parent company known as the San Joaquin Light & Power Company, has appropriated $300,000 for additions to the service. Arrangements are reported to have been made for establishing a branch line to Avila and that later the towns of Morro, Caucos and Cambria will be supplied.

SEATTLE, WASH.—The purchase of a completely developed power plant at a cost not to exceed $3,000,000 is proposed under the terms of an ordinance introduced at a recent meeting of the city council. The plant is desired to supple-

ment the present power plant at Cedar River. Construction of an additional unit to the steam auxiliary plant on Lake Union is also contemplated by the utilities committee. This addition will cost between $300,000 and $400,000. The present plant capacity will be doubled.

SPOKANE, WASH.—Hugh L. Cooper of New York, the engineer who constructed the Keokuk dam across the Mississippi and is head of the $6,000,000 Z Canyon hydroelectric project near Spokane, recently visited Chelan, according to report. The dam is to be constructed on the Chelan River and is to be 170 ft. high. The maximum capacity of the hydroelectric plant to be erected will be 120,000 h.p. and work to be started April 1, 1917. It is proposed to furnish electric power to the district between Winesap and the Okanogan country to be used for irrigation pumping. The Northern Pacific railway owns all the rights on the Chelan River three miles in extent with a fall of 300 ft. and owns other rights on Lake Chelan. It is working out plans for electrifying its line between Spokane and Seattle and may also electrify the line from Vancouver to Portland.

TELEPHONE AND TELEGRAPH.

KENNEWICK, WASH.—A 25-year franchise has been granted to A. F. Brown for construction of a telephone and telegraph system.

PASADENA, CAL.—The city of Pasadena has contributed $300 in cash and $200 in work for rebuilding the telephone line running the entire length of Arroyo Seco, a distance of seven miles.

EL CENTRO, CAL.—The Imperial Telephone System has moved from the little makeshift plant on Fifth street to its spacious new home on State street, between Sixth and Seventh which was erected at a cost of $80,000.

GLOBE, ARIZ.—The district commercial manager of the Western Union Telegraph Company has decided that it will be necessary, in order to fully relieve the wire congestion here, for the company to install quadruplex equipment, and has made recommendations accordingly.

MODESTO, CAL.—The local exchange plans to expend $10,000 for enlarging the telephone system. Plans have been received by Manager E. Garner, and call for three new lines from Modesto to Oakdale, Empire and Hughson. A 25-pair cable line will span Dry Creek. The open wire work on Needham avenue will be replaced with lead covered cable, 200 ft. beyond the city limits. The new construction will be under the supervision of J. F. Weitzenberg. The exchange facilities in the Modesto plant will be enlarged.

TRANSPORTATION.

LINDSAY, CAL.—Surveys have been made for a right of way for the Pacific Electric which plans to build its line into Lindsay.

IRRIGATION.

SACRAMENTO, CAL.—The Sacramento Realty Board will aid the Cosumnes property owners who want a water district formed to include approximately 30,000 acres. It is said that several of the largest property owners are opposed to the district.

DIXON, CAL.—Engineers Hawley, Whitney and Loveland in the employ of the State have reported on irrigation scheme to water 55,000 acres of land and save the output of Putah Creek which is now running to waste. Reservoir sites are under consideration at Devil's Gate and Guenoc, the costs of construction being $7,000,000 and $5,000,000 respectively.

TERRA BELLA, CAL.—The directors of the Terra Bella Irrigation District will receive sealed bids to November 13th for the construction of an irrigation works for the district. The work to be done comprises the construction of 16 wells and well pumping plants, five main boosting pumping plants and approximately 49 miles of pipe lines.

PARADISE, CAL.—The Paradise Irrigation District of Butte County has applied for permission to appropriate 19,600 acre ft. by storage of flood waters of Butte Creek, to be used in the irrigation of the lands of the district. It is proposed to begin work in the summer of 1917 and complete it within two years. The estimated cost is $350,000.

GLENN, CAL.—J. Overholtzer of Glenn has applied for permission to appropriate 60 cu. ft. per second of waters of the Sacramento River in Glenn county. The proposition is to divert the water by means of electrically driven pumps discharging into a main canal five miles in length. The estimated cost is $15,000.

MONTAGUE, CAL.—A survey is being made of the Webb tract comprising 2000 acres for the purpose of determining the number of acres that can be covered from their pumping plant on the Shasta River. Recently the Webb Bros. made application to the State Water Commission for permission to appropriate 12 cubic feet per second of the waters of Shasta River for the purpose of irrigating this land.

SAN DIMAS, CAL.—Work has been started toward bringing water to the San Dimas Heights tract. Water will be brought by way of San Dimas canyon to a point near the Mountain Spring ranch, thence by gravity to the top of the hills where a large new reservoir will be constructed. The estimated cost of the project is $1 500,000. The boring of a 6000 ft. tunnel will also be necessary.

OAKDALE, CAL.—Announcement of the Sierra and San Francisco Power Company for the construction of new reservoirs on the Stanislaus River will probably result in the reopening of negotiations with the Oakdale Irrigation District for the use of the stored water, after it has once been used for developing power. The power company previously agreed to sell the stored water to the districts for $1 per acre foot. This was considered too high by the irrigation board.

LLANO, CAL.—The Llano del Rio Company of Nevada, with headquarters at Llano, Los Angeles county, has applied to the state water commission for permission to appropriate for agricultural purposes 3000 cu. ft. of water per second from Big Rock Creek. The pipe line to convey the water to the lands will be one and three-fourths miles long and the project will be known as Big Rock Creek Irrigation Project. Included in the work is a dam 110 ft. high, impounding 5600 acre ft. and a reservoir covering 142 acres. The estimated cost of the dam is $90,000 and of the pipe lines $40,000.

ONTARIO, Cal.—Meetings have been held in Victorville, Apple Valley and in Los Angeles to formulate plans for financing and organizing the Victor Valley Irrigation District and to arrange for purchasing properties owned by the Arrowhead Reservoir & Power Company. The water district must be formed and money raised during the next four months, so that bonds may be voted to obtain the water company's properties. The sum of $2,500,000 will be necessary. The acquisition of water with proposed pipe line and irrigation ditches will reclaim close to 100,000 acres of land.

PLACERVILLE, CAL.—The great water system purchased several years ago by the Bea, Tevis and San Francisco Oakland Terminal Power Company as a possible supply for San Francisco, has been sold by the Placerville Gold Mining Company to the Western States Gas & Electric Company for a consideration of over $100,000, it became known recently upon the return of President Alexander Baring, who concluded the sale. Deeds are now being drawn. The system includes the waters of Echo, Silver and Audrane lakes and the South and Silver forks of the American River, and is one of the largest undeveloped systems in California.

ALPHABETICAL INDEX TO ADVERTISERS

The letter and number before each name are used in the classified page following

A-1 American Ever-Ready Works of National Carbon Co
Los Angeles; 755 Folsom St., San Francisco; Seattle.

B-1 Baker-Joslyn Company..... 3
71 New Montgomery St., San Francisco; 911 Western Ave., Seattle; 353 E. Second St., Los Angeles.

I-1 Benjamin Electric Manufacturing Co.....
590 Howard St., San Francisco.

C-1 Century Electric Co..... 5
906 So. Hope St., Los Angeles; 56 Natoma St., San Francisco; 65 Front St., Portland, Ore.

C-3 Crocker-Wheeler Co..... 3
87 New Montgomery St., San Francisco; 228 Central Avenue, Los Angeles.

C-4 Cutler-Hammer Manufacturing Co.....
579 Howard St., San Francisco; Morgan Bldg., Portland, Ore.; San Fernando Bldg., Los Angeles.

D-4 Davis Slate & Manufacturing Co.....
Chicago, Ill.

D-2 Dearborn Chemical Company..... 11
355 East Second St., Los Angeles; 301 Front St., San Francisco.

E-1 Edison Lamp Works of General Electric Co.....
Rialto Bldg., San Francisco; 724 So. Spring St., Los Angeles.

E-2 Edison Storage Battery Co..... 11
206-8-10 First St., (near Howard), San Francisco.

E-3 Electric Agencies Co.....
279-283 Minna St., San Francisco; 419-421 E. Third St., Los Angeles.

E-4 Electric Storage Battery Co.....
743 Rialto Bldg., San Francisco.

E-5 Electric, Railway & Manufacturing Supply Co..... 11
34 Second St., San Francisco.

E-6 Electric Novelty Works.....
533 Mission St., San Francisco.

E-7 Economy Fuse & Mfg. Co.....
Kinzie and Orleans Sts., Chicago.

F-3 Federal Sign System (Electric).....
618 Mission St., San Francisco.

G-1 General Electric Co..... 10
724 So. Spring St., Los Angeles; Worcester Bldg., Portland; Rialto Bldg., San Francisco; Colman Bldg., Seattle; Paulsen Bldg., Spokane.

H-1 Habirshaw Electric Cable Co., Inc.....
(See Western Electric Company.)

H-2 Hemingray Glass Co..... 11
236-240 So. Los Angeles St., Los Angeles; 345 Oak St., Portland; 807 Mission St., San Francisco.

H-3 Haller-Cunningham Electric Co..... 11
428 Market St., San Francisco.

H-4 Hubbard & Co.....
(See Pacific States Elec. Co.)

H-7 Hurley Machine Co..... 2
New York and Chicago. (See Pacific States Electric Co.)

I-2 Illinois Electric Co.....
261-263 So. Los Angeles St., Los Angeles.

I-3 Interstate Electric Novelty Co..... 3
111 New Montgomery St., San Francisco.

L-1 Leahy Manufacturing Co.....
Eighth and Alameda St., Los Angeles.

L-2 Locke Insulator Manufacturing Co..... 4
(See Pierson, Roeding & Co.)

M-2 McGlauflin Manufacturing Co.....
San Rafael, Cal.

M-3 Moore & Co., Charles C..... 3
Van Nuys Bldg., Los Angeles; Spalding Bldg., Portland; Kearns Bldg., Salt Lake City; Sheldon Bldg., San Francisco; Mutual Life Bldg., Seattle; Santa Rita Hotel Bldg., Tucson.

M-4 Morse Chain Company.....
Monadnock Bldg., San Francisco.

N-1 Nason & Co., R. N.....
151 Potrero Ave., San Francisco.

N-2 National Conduit & Cable Co., The.....
Trust and Savings Bldg., Los Angeles; Rialto Bldg., San Francisco.

N-3 National Lamp Works of G. E. Co.....
(All Jobbers.)

N-4 New York Insulated Wire Co.....
629 Howard St., San Francisco.

N-6 National Carbon Co.....
Cleveland, Ohio.

O-1 Okonite Co. (The)..... 12
(All Jobbers.)

P-2 Pacific States Electric Co..... 2
236-240 So. Los Angeles St., Los Angeles; 61-67 Fifth St. No., Portland; 200-210 Twelfth St., Oakland; 575 Mission St., San Francisco; 307 First Ave. So., Seattle.

P-4 Pelton Water Wheel Co..... 11
2219 Harrison St., San Francisco.

P-5 Pierson, Roeding & Co..... 4
Pacific Electric Bldg., Los Angeles; Rialto Bldg., San Francisco; Colman Bldg., Seattle.

P-7 Pittsburgh Piping & Equipment Co..... 12
Monadnock Bldg., San Francisco.

S-1 Schaw-Batcher Company, Pipe Works, The.....
211 J St., Sacramento; 356 Market St., San Francisco.

S-4 Southern Pacific Co..... 4
Flood Bldg., San Francisco.

S-5 Sprague Electric Works..... 5
Rialto Bldg., San Francisco; Colman Bldg., Seattle; Corporation Bldg., Los Angeles; Electric Bldg., Portland; Paulsen Bldg., Spokane.

S-6 Standard Underground Cable Co.....
First National Bank Bldg., San Francisco; Hibernian Bldg., Los Angeles; Central Bldg., Seattle, Wash.; 815 Newhouse Bldg., Salt Lake City, Utah.

T-1 Thomas & Co., R..... 12
Pacific States Electric Co. and Western Electric Co., Pacific Coast Representatives.

T-2 Tubular Woven Fabric Company.....
Pawtucket, R. I.

U-1 United Sheet Metal Works.....
575 Howard St., San Francisco.

W-1 Wagner Electric Manufacturing Company.....
St. Louis, Mo.

W-2 Western Electric Co.....
Eighth and Santee Sts., Los Angeles; 1900 Telegraph Ave., Oakland, Cal.; 680 Folsom St., San Francisco; 907 First Ave., Seattle; 45 North Fifth St., Portland, Ore.

W-3 Ward-Leonard Electric Co..... 12
Mt. Vernon, New York.

W-4 Westinghouse Electric & Manufacturing Co..... 6
50-52 East Broadway, Butte; Van Nuys Bldg., Los Angeles; Couch Bldg., Portland; 212 So. W. Temple, Salt Lake City; First National Bank Bldg., San Francisco; Second and Cherry Sts., Seattle; Paulsen Bldg., Spokane.

W-6 Westinghouse Lamp Co.....
(See Westinghouse Electric & Manufacturing Co.)

W-8 Western Pipe & Steel Co.....
444 Market St., San Francisco; 1758 North Broadway, Los Angeles.